



Manitoba oculotrichoanal syndrome

Manitoba oculotrichoanal syndrome is a condition involving several characteristic physical features, particularly affecting the eyes (oculo-), hair (tricho-), and anus (-anal).

People with Manitoba oculotrichoanal syndrome have widely spaced eyes (hypertelorism). They may also have other eye abnormalities including small eyes (microphthalmia), a notched or partially absent upper eyelid (upper eyelid coloboma), eyelids that are attached to the front surface of the eye (corneopalpebral synechiae), or eyes that are completely covered by skin and usually malformed (cryptophthalmos). These abnormalities may affect one or both eyes.

Individuals with Manitoba oculotrichoanal syndrome usually have abnormalities of the front hairline, such as hair growth extending from the temple to the eye on one or both sides of the face. One or both eyebrows may be completely or partially missing. Most people with this disorder also have a wide nose with a notched tip; in some cases this notch extends up from the tip so that the nose appears to be divided into two halves (bifid nose).

About 20 percent of people with Manitoba oculotrichoanal syndrome have defects in the abdominal wall, such as a soft out-pouching around the belly-button (an umbilical hernia) or an opening in the wall of the abdomen (an omphalocele) that allows the abdominal organs to protrude through the navel. Another characteristic feature of Manitoba oculotrichoanal syndrome is a narrow anus (anal stenosis) or an anal opening farther forward than usual. Umbilical wall defects or anal malformations may require surgical correction. Some affected individuals also have malformations of the kidneys.

The severity of the features of Manitoba oculotrichoanal syndrome may vary even within the same family. With appropriate treatment, affected individuals generally have normal growth and development, intelligence, and life expectancy.

Frequency

Manitoba oculotrichoanal syndrome is estimated to occur in 2 to 6 in 1,000 people in a small isolated Ojibway-Cree community in northern Manitoba, Canada. Although this region has the highest incidence of the condition, it has also been diagnosed in a few people from other parts of the world.

Genetic Changes

Manitoba oculotrichoanal syndrome is caused by mutations in the *FREM1* gene. The *FREM1* gene provides instructions for making a protein that is involved in the formation

and organization of basement membranes, which are thin, sheet-like structures that separate and support cells in many tissues.

The *FREM1* protein is one of a group of proteins, including proteins called FRAS1 and *FREM2*, that interact during embryonic development as components of basement membranes. Basement membranes help anchor layers of cells lining the surfaces and cavities of the body (epithelial cells) to other embryonic tissues, including those that give rise to connective tissues such as skin and cartilage.

The *FREM1* gene mutations that have been identified in people with Manitoba oculotrichoanal syndrome delete genetic material from the *FREM1* gene or result in a premature stop signal that leads to an abnormally short *FREM1* protein. These mutations most likely result in a nonfunctional protein.

Absence of functional *FREM1* protein interferes with its role in embryonic basement membrane development and may also affect the location, stability, or function of the FRAS1 and *FREM2* proteins. The features of Manitoba oculotrichoanal syndrome may result from the failure of neighboring embryonic tissues to fuse properly due to impairment of the basement membranes' anchoring function.

Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- Marles-Greenberg-Persaud syndrome
- Marles Greenberg Persaud syndrome
- Marles syndrome
- MOTA

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Marles Greenberg Persaud syndrome
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C1855425/>

Other Diagnosis and Management Resources

- GeneReview: Manitoba Oculotrichoanal Syndrome
<https://www.ncbi.nlm.nih.gov/books/NBK1728>
- MedlinePlus Encyclopedia: Omphalocele Repair
<https://medlineplus.gov/ency/article/002938.htm>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Imperforate Anus
<https://medlineplus.gov/ency/article/001147.htm>
- Encyclopedia: Omphalocele
<https://medlineplus.gov/ency/article/000994.htm>
- Encyclopedia: Omphalocele Repair
<https://medlineplus.gov/ency/article/002938.htm>
- Encyclopedia: Umbilical Hernia
<https://medlineplus.gov/ency/article/000987.htm>
- Health Topic: Vision Impairment and Blindness
<https://medlineplus.gov/visionimpairmentandblindness.html>

Genetic and Rare Diseases Information Center

- Manitoba oculotrichoanal syndrome
<https://rarediseases.info.nih.gov/diseases/3395/manitoba-oculotrichoanal-syndrome>

Additional NIH Resources

- National Eye Institute: Facts About Anophthalmia and Microphthalmia
<https://nei.nih.gov/health/anoph/anophthalmia>

Educational Resources

- Centers for Disease Control and Prevention: Facts About Omphalocele
<https://www.cdc.gov/ncbddd/birthdefects/Omphalocele.html>
- Disease InfoSearch: Marles Greenberg Persaud syndrome
<http://www.diseaseinfosearch.org/Marles+Greenberg+Persaud+syndrome/4481>
- MalaCards: manitoba oculotrichoanal syndrome
http://www.malacards.org/card/manitoba_oculotrichoanal_syndrome
- University of Arizona College of Medicine
<http://disorders.eyes.arizona.edu/handouts/manitoba-oculotrichoanal-syndrome>

Patient Support and Advocacy Resources

- Children's Craniofacial Association
<http://www.ccakids.com/>

GeneReviews

- Manitoba Oculotrichoanal Syndrome
<https://www.ncbi.nlm.nih.gov/books/NBK1728>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28manitoba+oculotrichoanal+syndrome%5BTIAB%5D%29+OR+%28MOTA+syndrome%5BALL%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D>

OMIM

- MANITOBA OCULOTRICHANOAL SYNDROME
<http://omim.org/entry/248450>

Sources for This Summary

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Reprinted from Genetics Home Reference:

<https://ghr.nlm.nih.gov/condition/manitoba-oculotrichoanal-syndrome>

Reviewed: May 2011

Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
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